Newsholme, has struck out a new line. The vacant wards of the hospital are utilised for the education of consumptives. Patients living at home are admitted to the hospital for short periods (four to six weeks), during which time they are instructed as to how they should live and in all the precautions and preventive measures they should practise on returning to their homes. In this way a constant stream of enlightened information is continually disseminated among the most ignorant. Some other towns are following this excellent example.

Although it has been shown that much time, money, and energy are being expended by various public and private bodies in the effort to throw a net over the whole tuberculous population, yet it must be confessed there remain many gaps which must be filled up if success is to be attained in our war against consumption. Proper organisation and coordination of effort are needed. A well-thought-out scheme must be put in action throughout the country and controlled by some central authority. This duty falls naturally to the Local Government Board, and is it too much to expect that a "tuberculosis committee" of that board may be appointed the chief duty of which should be the control and direction of the isolated efforts now being made in various parts of the country? By this means greater efficiency and better results would accrue at a proportionately smaller cost. R. FIELDING-OULD.

ATMOSPHERIC ELECTRICITY IN ALGERIA.

IN the *Revue générale des Sciences* of May 30, M. Ch. Nordmann gives an account of the phenomena of atmospheric electricity, and of one or two of the latest theories on the subject, and also describes some recent observations made by himself in Algeria. Atmospheric electricity is now so large a subject that the essay naturally covers only a part of the ground, and does not go into many details. It shows, however, the clearness and lightness of touch one expects from our neighbours across the Channel. In a few points perhaps its conclusions are a little precipitate, but it contains some shrewd criticisms of other people's theories. The paper contains copies of some interesting electrograms, mostly obtained by the author in August and September, 1905, at Philippeville, on the southern coast of the Mediterranean.

M. Nordmann first points out that the normal potential gradient in the atmosphere may arise from a negative charge on the earth, or a positive charge in the air, or from the two combined. He regards the presence of an excess of positive electrification in the air as proved by the fall in the potential gradient with increasing height observed in balloon ascents. He refers to Elster and Geitel as having discovered that any charged body, however well insulated, loses its charge in ordinary atmospheric air. Historically this is hardly complete, as Elster and Geitel merely confirmed what Linss had discovered many years before. Elster and Geitel have, of course, added enormously to our knowledge of the subject, and they gave it much greater precision, besides bringing it into line with recent laboratory research.

Passing to the diurnal variation in the potential gradient, p. 445, M. Nordmann refers to the double period with maxima about 8 a.m. and 8 p.m. as having been regarded until recently as universal. He next refers to observations on mountains, especially those on the Sonnblick, as showing that at high levels the afternoon minimum disappears, the diurnal variation becoming simple, and mentions Chauveau as having established the existence of the same phenomenon on the Eiffel Tower. In both cases the observations show rather a reduced prominence in the afternoon minimum than its total absence, and on p. 447 Nordmann somewhat qualifies his earlier remarks. His own observations at Philippeville supply a very interesting example of a simple period. Observing on an eminence 160 metres high, immediately adjacent to the sea, he obtained as the mean from the quietest days of his stay (the number of which is not stated) a diurnal variation with a minimum from 4 a.m. to 5 a.m., and a maximum about 5 p.m. The value was above the mean from 11 a.m. to 10 p.m., and below from 11 p.m. to 10 a.m. During the day the wind blew straight from the sea, and during the night from the land. The results are so unusual, and if confirmed so suggestive, that an extension of the observations over a much longer period is desirable. Until that is done, one cannot feel sure that the results are fairly representative, even of the particular season of the year when they were observed. Among the electrograms reproduced is one showing the effects of a sirocco from the desert. The large and sudden changes of potential, the curves going off the sheet both in the positive and negative directions, are similar to those met with in England during thunder or heavy rain. Other curves of interest are those showing the changes of the potential and of the positive ionisation of the air at Philippeville during the total eclipse of the sun on August 30, 1905. Between the times of the first and last contacts the potential was *slightly* above its mean for the time of the day, and the ionisation fell decidedly as totality approached. The maximum in the one curve and the minimum in the other occurred forty-five minutes after totality.

In his criticisms of theories by Elster and Geitel and Ebert the author points out that at Philippeville the potential was below, not above, its mean when the wind blew off the land, and that the barometric pressure showed the ordinary double period. In discussing some theoretical views of his own, he refers to a difficulty in that "en passant de l'été à l'hiver la diminution du rayonnement solaire s'accompagne d'un abaissement du champ, en passant du jour à la nuit elle coincide, au contraire, avec une augmentation." This is rather puzzling in view of the author's perfectly correct statement, p. 446, that the potential is highest in winter. C. CHREE.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE University of Greifswald has received a legacy of 60,000 marks under the will of the late Dr. Milschewsky, who died recently in Loburg.

PROF. MORRIS TRAVERS, F.R.S., professor of chemistry at the University College, Bristol, has been appointed director of the Indian Institute of Science which is to be established in Bangalore.

ACCORDING to the *Chemiker Zeitung*, the authorities of the Zürich University have decided to increase considerably the University lecture and laboratory fees chargeable to foreigners, with the idea of lessening to some extent the present high percentage of foreigners who attend.

IN the columns of the *Chemiker Zeitung* for last week we read that the Grecian Government recently received from St. Petersburg a legacy of about eight million roubles, or 1¼ millions sterling, which was left in the beginning of the last century by a rich Grecian merchant, of the name of Dombolis, with the condition that after the lapse of a definite time a second Grecian university should be built in Corfu out of the capital and interest, and be called the Kapodistrias University.

THE fees for the examinations of the German technical high schools have been fixed on the following scale:—for the preliminary diploma examination, 60 marks for naturalised Germans, 120 marks for foreigners; for the diploma examination, 120 marks for Germans and 240 marks for foreigners; for the doctor of engineering examination, 240 marks, of which the first half is to be paid when the examination thesis is handed in, and the remainder before the oral examination is taken.

THE university buildings of Groningen were almost completely destroyed by fire on August 30. The fire is supposed to have been caused by careless use of benzine or methylated spirits on the part of workmen. The natural history museum and the chemical and pharmaceutical laboratories were entirely destroyed, while the hygienic and physiological laboratories were saved. The university buildings, which, strangely enough, were not insured, were erected in 1846–1852. An emergency committee has made arrangements for the lectures and classes of the coming session to be begun as usual. The University has approximately five hundred students.

THE prospectus of the Borough Polytechnic Institute for the session 1906–7 contains abundant proof that the educa-

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tional needs of the young men and women of South London are well provided for. The object of the classes is to provide sound instruction and to promote industrial skill and general knowledge. It is interesting to note that the trade classes are intended especially and only for those who are engaged in the several trades. Among such classes may be mentioned as typical those for motor drivers and repairers, motor engineers and designers, sanitary inspectors, men engaged in electrical and building industries, and bakers and confectioners. Special attention is paid also to the technical education of women, for whom a variety of trade classes has been arranged. Women are trained for home duties in a special department, and prominence is given to the scientific principles upon which successful domestic practices depend. The arrangements made for the coming winter are of a very complete character.

IN the opening pages of the new calendar of the University College Hospital Medical School is an explanatory statement of the new arrangements for medical education consequent upon the formation by the University of London of university centres for instruction. Under these arrangements a student will enter one of the university centres for the preliminary and intermediate medical studies, and will then complete his career at the Hospital Medical School, the whole of the energies and resources of which will be devoted to a development of the medical studies proper. The calendar contains an engraving of the new buildings of University College Hospital, provided by the generosity of the late Sir Blundell Maple, which will be opened formally by H.R.H. the Duke of Connaught on November 6. Another engraving shows an elevation of the new medical school buildings erected through the munificence of Sir Donald Currie. These buildings are being specially constructed with laboratories and research rooms for medicine, surgery, pathology, and other departments.

A COMPREHENSIVE resolution referring to education was adopted last week at the Trade Union Congress at Liverpool. Among the points accepted by the congress as essential to a sound educational system are the following :—(1) scientific physical education with medical inspection and records of the physical development of all children attending State schools, and skilled medical attendance for any child requiring same; (2) a national system of education under full popular control, free and secular, from the primary school to the university; (3) secondary and technical education to be an essential part of every child's education, and to be secured by such an extension of the scholarship system as will place a maintenance scholarship within the reach of every child, and thus make it possible for all children to be full-time day pupils up to the age of sixteen; (4) the best intellectual and technical training to be provided for the teachers of the children; (5) the cost of education to be met by grants from the Imperial Exchequer, and by the restoration of misappropriated educational endowments.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 28.—"Researches on Explosives." Part iv. By Sir A. **Noble,** Bart., K.C.B., F.R.S.

In part iii. of his "Researches on Explosives" the author gave the results of a very extensive series of experiments on certain explosives, which were, first, the cordite of the Service, known as Mark I.; second, the modified cordite, known as M.D.; and third, the nitrocellulose, known as Rottweil R.R. The experiments made extended, for all the above explosives, from densities of 0·05 to 0·45 or 0·50, and pressures of from 2·75 tons per square inch (419 atmospheres) to pressures of 60 tons per square inch (9145 atmospheres).

In the present paper full details are given of three other explosives, and comparisons are made between them and the explosives which have been so much experimented with in this country. If reference be made to the tables, which cannot be given in this abstract, it will be seen how wide are the differences between the explosives, not only in the absolute volumes of the several gases, but in the variations with reference to the densities at which they were fired.

Thus, for example, comparing Norwegian 165 and Italian ballistites, while in the former the carbon monoxide commences at the density 0·05, with a percentage volume of 38·5, falling at a density of 0·45 to 22 per cent., the carbon dioxide commences with 13·3 per cent., rising rapidly to 31 per cent. In the latter explosive the CO commences at 20·5 per cent., and falls slowly to 15 per cent., while the CO_2 commences a little above 26 per cent., rising also comparatively slowly to nearly 34 per cent.

But there are, in these two explosives, other remarkable differences. Thus, in the Italian ballistite, at a density of 0·05, the volume of methane CH_4 is a mere trace, about 0·02 per cent., and it remains very much lower than is the case with any other explosive, being only 1·9 per cent. at the density of 0·45. With the Norwegian, on the other hand, the CH_4, although the volume at commencement is only 0·04 per cent., is, at 0·45 density, 11 per cent.

Again, as might be expected, from the large quantity of CH_4 found in the case of the Norwegian ballistite, the volume of hydrogen falls from more than 20 per cent. to about 9 per cent.; in the Italian the H rises from about 8 per cent. to about 10 per cent., falling slightly at higher densities.

In both explosives the N is practically constant at about 12 and 16 per cent. respectively, but there is a very great difference as regards the H_2O. In the Norwegian the H_2O is constant at 14 per cent., there being no greater difference than might be expected from errors of observation, while, in the Italian, the H_2O, which commences at density 0·05, with a volume of 29 per cent., falls at a density of 0·45 to about 24 per cent. No other explosive approaches the Italian ballistite in respect to the large volume of aqueous vapour formed, especially at low densities.

In the tables are given the volumes in cubic centimetres per gram of the permanent and total gases, and curves have been drawn representing for the six explosives the observations of these volumes. In the case of five of the explosives there is, with increasing density, a very considerable decrease in volume, but with the Italian ballistite, throughout the range of the experiments, there is hardly any change. Curves representing these volumes are concave to the axis of abscissæ.

In the tables are shown the units of heat, both for water fluid and water gaseous. Curves have also been drawn for the units of heat (water gaseous); the curves in this instance are all convex to the axis of abscissæ, and it may be noted that, where the volume of gas per gram is large, the units of heat are low, and that, where the volumes of gas are rapidly decreasing, the curves representing the amount of heat developed show a rapid increase.

The next point to be considered is, the data being as is shown in the tables, what temperature are we to assign to that generated by the explosion? With the view of studying the question, the author resorted to two methods :—(1) Knowing with very considerable accuracy the units of heat (water gaseous) generated by the explosion, and having determined approximately the specific heat of the gases, the temperature of explosion should be given by the equation

$$t = \frac{\text{gram units of heat}}{\text{specific heat}} \quad . \; . \; . \; . \; . \; . \; . \quad (1)$$

(2) Knowing also with considerable accuracy the pressure at any given density, and knowing the pressure p_0 when the volume of gas generated is reduced to the temperature of 0° C., and a pressure of 760 mm. of mercury, the temperature is given by the equation

$$t = \frac{p - p_0}{0{\cdot}00367 \; p_0} \quad . \; . \; . \; . \; . \; . \; . \; . \quad (2)$$

With reference to equation (1), the specific heat of CO_2 is a very important factor in this determination, and the recent researches of Messrs. Holborn and Austin upon the specific heat of gases at constant pressure at high temperatures having apparently shown that the specific heats given by Mallard and Le Chatelier for temperatures above 100° C. are considerably too high, the author has taken the figures given by the former physicists, which, it may be remarked, up to temperatures of 800° C., are confirmed by Langen.

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